Decadal Climate Studies with Enhanced Variable and Uniform Resolution GCMs Using Advanced Numerical Techniques

Michael Fox-Rabinovitz, P.I., University of Maryland,

J. Cote, Co-P.I, CMS/RPN and UQAM, Co-I.s: F. Baer, D. Allen,

E. H. Berbery, K. Pickering, U. of MD, J. Tribbia, NCAR,

G. Stenchikov, Rutgers U. of NJ,

M. Deque, Meteo-France, J. McGregor, CSIRO, Australia

Major Goals

➤ Developing the stretched-grid (SG) GCMs using advanced numerical techniques and ensembles. The SG-GCMs produce accurate and cost-efficient regional climate simulations; provide efficient regional downscaling to mesoscales; allow us to preserve the high quality of both global and regional circulation while providing consistent interactions between global and regional scales.

➤ Conducting decadal climate studies on regional-to-global scale anomalous climate events, for studying climate variability and predictability

➤ Conducting atmospheric chemistry experiments

➤ Analyzing the multi-model ensemble of regional climate simulations produced by SGMIP (Stretched Grid Model Intercomparison Project).

➤ Collaborating with our Canadian partners and with the SGMIP participants

1. Fox-Rabinovitz, M. S., E. H. Berbery, L.L. Takacs, and R.C. Govindaraju, 2005: A multiyear ensemble simulation of the U.S. climate with a stretched-grid general circulation model", *Mon. Wea. Rev.,* 133, pp. 2505-2525.

2. Fox-Rabinovitz, M.S., J. Cote, M. Deque, B. Dugas, J. McGregor, 2006: Variable-Resolution GCMs: Stretched-Grid Model Intercomparison Project (SGMIP), *J. Geophys. Res.,* in press.

3. Park, R. J., K. E. Pickering, D. J. Allen, G. L. Stenchikov, and M. S. Fox-Rabinovitz, 2004: "Global simulation of tropospheric ozone using the University of Maryland Chemical Transport Model (UMD-CTM) 2. Regional downscaling of transport and chemistry over the Central United States" J. Geophys. Res., **109**, D09301, doi:10.1029/2003JD004269,.

4. Allen, D. J., K. E. Pickering, and M. Fox-Rabinovitz, 2004: Evaluation of pollutant outflow and CO sources during TRACE-P using model-calculated, aircraft-based, and MOPITT-derived CO concentrations, J. Geophys. Res., 109, doi:10.1029/2003JD2003004250

5. Krasnopolsky, V.M., and M.S. Fox-Rabinovitz, 2006: Complex hybrid models combining deterministic and machine learning components for numerical climate modeling and weather prediction, Neural Networks 19, 122–134.

International SGMIP

➤ **Participating centers/groups and models:**

• **C-CAM, CSIRO (Australia),**

• **GEM GCM, RPN (Environment Canada),**

• **ARPEGE GCM, Météo-France,**

• **GEOS GCM, NASA/GSFC**

• **Potentially two more models**

➤ SGMIP-1 (phase-1) has been completed in 2005; the 12-year (1987-98) multi-model ensemble simulations for the U.S. region of interest (Fox-Rabinovitz et al., JGR, 2006)

➤ SGMIP-2 (phase-2) is under way; the 25-year (1979-2003) simulations; the U.S. and European regions of interest; includes both high-resolution variable *and* uniform grid GCMs and their multi-model ensembles

➤ **SGMIP web site: http://essic.umd.edu/~foxrab/sgmip.html**